

## WHAT IS CLAIMED IS:

1. A frame for an ATV comprising:

a first frame member;

a second frame member;

at least a first cross member and a second cross member extending between said first and second frame members to thereby define a closed perimeter with an engine receiving space therein;

first and second suspension mounting points associated with at least one of the first frame member, the second frame member, the first cross member, and the second cross member; and

wherein at least one of the first frame member and the second frame member is positioned substantially along a longitudinal centerline of the frame and extends from the first suspension mounting point to the second suspension mounting point.

2. A frame according to claim 1, wherein at least one of the first and second frame members consists essentially of a single beam.

3. A frame according to claim 2, wherein said single beam comprises a closed tubular structure.

4. A frame according to claim 1, wherein at least one of the first and second suspension mounting points is on a surface of one of the first and second frame members.

5. A frame according to claim 1, wherein a ratio of a sectional width to a sectional height of at least one of the first member, the second member, the first cross member, and the second cross member is greater than one.

6. A frame according to claim 5, wherein at least one of said first and second members and said first and second cross members has a rectangular cross section.

7. A frame according to claim 5, wherein at least one of said first and second members and said first and second cross members has an oval cross section, said sectional width being a major axis of said oval cross section and said sectional height being a minor axis of said oval cross section.

8. A frame according to claim 5, wherein each of said first and second members and said first and second cross members has an elliptical cross section said sectional width being a major axis of said elliptical cross section and said sectional height being a minor axis of said elliptical cross section.

9. A frame according to claim 1, wherein said first member is vertically aligned with said second frame member.

10. A frame according to claim 1, wherein each of said first and second members and said first and second cross members has a uniform cross section throughout a length thereof.

11. A frame according to claim 1, wherein each of said first and second members and said first and second cross members has an identical cross sectional shape.

12. A frame according to claim 1, wherein each of said first and second members and said first and second cross members has an identical cross sectional size.

13. A frame according to claim 1, wherein a forward portion of said second member is bent upwardly from horizontal.

14. A frame according to claim 13, wherein said forward portion is bent at an angle between  $0^{\circ}$  and  $17^{\circ}$  from horizontal.

15. A frame according to claim 14, wherein said forward portion is bent at an angle of about  $8^{\circ}$  from horizontal.

16. A frame according to claim 1, further comprising a plurality of laterally extending connecting members extending generally outwardly from and fixedly mounted to one of said first and second frame members.

17. A frame according to claim 1, wherein one of said first and second frame members is bent toward the other of said first and second frame members proximate one end thereof to thereby provide one of said first and second cross members.

18. A frame according to claim 1, wherein a rearward portion of said second frame member is bent generally upwardly and abuts and connects to a portion of said first member, thereby forming at least one of said first and second cross members.

19. A frame according to claim 1 further comprising a rear suspension mounting structure rigidly mounted to one of said first and second suspension mounting points.

20. A frame according to claim 1, wherein said first frame member includes a plurality of body mounting structures connected thereto, each of said plurality of body mounting structures forming body mounting portions thereon.

21. A frame according to claim 1, wherein each of the first and the second frame members consists essentially of a single beam.

22. A frame according to claim 1, wherein each of the first and second frame members and the forward and rearward cross members consists essentially of a single beam

23. An ATV comprising:  
an engine;  
at least three wheel assemblies, at least one of the at least three wheel assemblies being powered by said engine;

a steering system operatively coupled to at least one of said at least three wheel assemblies;

a suspension system operatively coupled to each of said wheel assemblies; and

a frame, said frame including:

an upper frame member;

a lower frame member;

at least a forward cross member and a rearward cross member extending between said upper and lower frame members to thereby define a closed perimeter with an engine receiving space therein,

first and second suspension mounting points associated with at least one of the upper frame member, the lower frame member, the forward cross member, and the rearward cross member; and

wherein at least one of the upper frame member and the lower frame member is positioned substantially along a longitudinal centerline of the frame and extends from the first suspension mounting point to the second suspension mounting point.

24. An ATV according to claim 23, wherein at least one of the upper and lower frame members consists essentially of a single beam.

25. A frame according to claim 24, wherein said single beam comprises a closed tubular structure.

26. An ATV according to claim 23, wherein each of the upper and lower frame members consists essentially of a single beam.

27. An ATV according to claim 26, wherein each of the forward and rearward cross members consists essentially of a single beam.

28. A frame according to claim 23, wherein at least one of the first and second suspension mounting points is on a surface of one of the upper and lower frame members.

29. An ATV according to claim 23, wherein a ratio of a sectional width to a sectional height of each of the upper frame member, the lower frame member, the forward cross member, and the rearward cross member is greater than one.

30. An ATV according to claim 29, wherein each of said upper and lower frame members and said forward and rearward cross members has an oval cross section, said sectional width being a major axis of said oval cross section and said sectional height being a minor axis of said oval cross section.

31. An ATV according to claim 29, wherein each of said upper and lower frame members and said forward and rearward cross members has an elliptical cross section, said sectional width being a major axis of said elliptical cross section and said sectional height being a minor axis of said elliptical cross section.

32. An ATV according to claim 29, wherein said upper frame member is vertically aligned with said lower member.

33. An ATV according to claim 29, wherein each of said upper and lower frame members and said forward and rearward cross members has a uniform cross section throughout a length thereof.

34. An ATV according to claim 29, wherein each of said upper and lower frame members and said forward and rearward cross members has an identical cross sectional shape.

35. An ATV according to claim 29, wherein each of said upper and lower frame members and said forward and rearward cross members has an identical cross sectional size.

36. An ATV according to claim 29, wherein a forward portion of said lower frame member is bent upwardly from horizontal.

37. An ATV according to claim 36, wherein said forward portion is bent at an angle between 0° and 17° from horizontal.

38. An ATV according to claim 37, wherein said forward portion is bent at an angle of about 8° from horizontal.

39. An ATV according to claim 29, further comprising a plurality of laterally extending connecting members extending generally outwardly from and fixedly mounted to said upper member.

40. An ATV according to claim 39, wherein one of said upper and lower frame members is bent toward the other of said upper and lower frame members proximate one end thereof to thereby provide one of said forward and rearward cross members.

41. An ATV according to claim 29, wherein a rearward portion of said lower frame member is bent generally upwardly and abuts and connects to a rearward portion of said upper frame member, thereby forming said rearward cross member.

42. An ATV according to claim 29, further comprising a rear suspension mounting structure rigidly mounted to at least one of said first and second suspension mounting points.

43. An ATV according to claim 29, wherein said upper frame member includes a plurality of body mounting structures connected thereto, each of said plurality of body mounting structures forming body mounting portions thereon.

44. An ATV according to claim 29, wherein said suspension system includes a forward suspension subsystem and a rearward suspension subsystem mounted to said first and second suspension mounting points, respectively.



45. An ATV according to claim 44, wherein at least one of said forward and rearward suspension subsystems is a fully-independent type suspension subsystem.

46. An ATV according to claim 44, wherein as least one of said forward and rearward suspension subsystems is a semi-independent type suspension subsystem.

47. An ATV according to claim 44, wherein at least one of said forward and rearward suspension subsystems is a non-independent type suspension subsystem.

48. An ATV according to claim 44, wherein at least one of said forward and rearward suspension subsystems is connectable with said lower frame member.

49. An ATV according to claim 48, wherein said at least one of said forward and rearward suspension subsystems is connected to an exterior surface of said lower member.

50. A frame for an ATV, said frame comprising:  
a support module with a central opening;  
said support module including first and second longitudinal frame members interconnected by forward and rearward cross members;

wherein each of the first and second frame members consists essentially of a single beam.

51. A frame according to claim 50, wherein each of the forward and rearward cross members consists essentially of a single beam.

52. A frame according to claim 50, wherein said single beam comprises a closed tubular structure.

53. A frame according to claim 50, further comprising first and second suspension mounting points, wherein at least one of the first and second frame members extends from the first suspension mounting point to the second suspension mounting point.

54. A frame according to claim 53, wherein at least one of the first and second suspension mounting points is on a surface of one of the first and second frame members.

55. A frame according to claim 50, wherein each of said first and second frame members and first and second cross members has a sectional profile with a first sectional dimension thereof greater than a second sectional dimension thereof, said second sectional dimension being normal to said first sectional dimension.

56. A frame according to claim 50, wherein one of said first and second frame members is bent toward the other of said first and second frame members proximate one end thereof to thereby provide one of said first and second cross members.

57. A frame according to claim 50, wherein said first frame member is disposed above and in aligned relation to said second frame member.

58. A frame according to claim 50, wherein a forward portion of said second frame member forward of said support module is bent upwardly from horizontal.

59. A frame according to claim 58, wherein said forward portion is bent at an angle between  $0^{\circ}$  and  $17^{\circ}$  from horizontal.

60. A frame according to 59, wherein said forward portion is bent at an angle of about  $8^{\circ}$  from horizontal.

61. A frame according to claim 50, further comprising a plurality of laterally extending connecting members extending generally outwardly from and fixedly mounted to said first frame member.

62. A frame according to claim 50, further comprising a pair of opposing horizontally transversely extending rider support structures mounted and extending outwardly from respective sides of said second frame member,

said rider support structures being constructed and arranged to provide upwardly facing rider support surfaces thereon.

63. A frame according to claim 50, wherein said first frame member is shaped to form a generally downwardly extending trough portion at a central region thereof, said trough portion being configured and positioned to be closer to said second frame member than regions of said first frame member immediately forward and rearward of said trough portion.

64. A frame according to claim 50, wherein a forward portion of said first frame member is bent generally downwardly and abuts and connects to said second frame member to form said first cross member.

65. A frame according to claim 50, further comprising a support structure rearward of said support module extending between said first and second frame members and being connected at respective ends thereto.

66. A frame according to claim 50, wherein a rearward portion of said second frame member is bent generally upwardly and abuts and connects to a rearward portion of said first frame member, thereby forming said second cross member.

67. A frame according to claim 50, further comprising a swing arm mounting structure rigidly mounted to one of said first and second suspension

mounting points to be within said central opening adjacent said second cross member and said second frame member.

68. A frame according to claim 67, wherein said swing arm mounting structure provides an engine mounting portion.

69. A frame according to claim 50, wherein said first frame member includes a plurality of body mounting structures connected thereto, each of said plurality of body mounting structures defining body mounting portions thereon.

70. A frame according to claim 50, wherein said first sectional dimension is a major axis of an ellipsoidal sectional profile and said second sectional dimension is a minor axis of said ellipsoidal sectional profile.

71. An ATV comprising:

- an engine;
- at least three wheel assemblies, at least one of the at least three wheel assemblies being powered by the engine;
- a steering system operatively coupled to at least one of said at least three wheel assemblies;
- a suspension system operatively coupled to each of said wheel assemblies; and
- a frame, said frame including:
  - a support module with a central opening for receiving the engine;

said support module including upper and lower longitudinal frame members interconnected by forward and rearward cross members; wherein each of the upper and lower frame members consists essentially of a single beam.

72. An ATV according to claim 71, wherein each of the forward and rearward cross members consists essentially of a single beam.

73. An ATV according to claim 71, wherein said single beam comprises a closed tubular structure.

74. An ATV according to claim 71, further comprising first and second suspension mounting points, wherein at least one of the upper and lower frame members extends from the first suspension mounting point to the second suspension mounting point.

75. An ATV according to claim 74, wherein at least one of the first and second suspension mounting points is on a surface of one of the first and second frame members.

76. An ATV according to claim 71, wherein at least one of said upper and lower frame members and forward and rearward cross members having a sectional profile with a first sectional dimension thereof greater than a second sectional dimension thereof, said second sectional dimension being normal to said first sectional dimension.

77. An ATV according to claim 71, wherein said engine is disposed within said central opening of said support module and is connectable with at least one of said lower frame member, said upper frame member, said forward cross member, and said rearward cross member.

78. An ATV according to claim 71, wherein one of said upper and lower members is bent toward the other of said upper and lower members proximate one end thereof to thereby provide one of said forward and rearward cross members.

79. An ATV according to claim 71, wherein said upper frame member is disposed above and in aligned relation to said lower frame member.

80. An ATV according to claim 71, wherein a portion of said lower frame member forward of said support module is bent upwardly from horizontal.

81. An ATV according to claim 80, wherein said portion of said lower frame member forward of said support module is bent at an angle between 0° and 17° from horizontal.

82. An ATV according to 81, wherein said portion of said lower frame member forward of said support module is bent at an angle of about 8° from horizontal.

83. An ATV according to claim 71, further comprising a plurality of laterally extending connecting members extending generally outwardly from and fixedly mounted to said upper frame member.

84. An ATV according to claim 71, further comprising a pair of opposing horizontally transversely extending rider support structures mounted and extending outwardly from respective sides of said lower frame member, said rider support structures being constructed and arranged to provide upwardly facing rider support surfaces thereon.

85. An ATV according to claim 71, wherein said upper frame member forms a generally downwardly extending trough portion at a central region thereof, said trough portion being configured and positioned to be closer to said lower frame member than regions of said upper member immediately forward and rearward of said trough portion.

86. An ATV according to claim 71, wherein a forward portion of said upper frame member is bent generally downwardly and abuts and connects to said lower frame member to form said forward cross member.

87. An ATV according to claim 71, further comprising a support module rearward of said support module extending between said upper and lower frame members and being connected at respective ends thereto.



88. An ATV according to claim 71, wherein said drive system includes a rear differential mountable to said support module, said rear differential being operatively coupled to said engine via a driveshaft extending therebetween.

89. An ATV according to claim 88, wherein said rearward cross member defines a horizontally extending opening therein, said driveshaft extending therethrough.

90. An ATV according to claim 71, wherein said suspension system includes a rear suspension pivot structure mounted to one of said first and second suspension mounting points adjacent said rearward cross member to be disposed within said central opening of said support module.

91. An ATV according to claim 90, wherein said suspension system further includes a pair of rearward trailing arms, one end of each of said trailing arms being pivotably connectable with said rear suspension pivot structure, each of said trailing arms extending generally rearwardly from said one end, a second end opposite said one end of each trailing arm being connected to a respective one of said wheel assemblies.

92. An ATV according to claim 71, wherein said suspension system includes:

a plurality of a-arm connecting structures mounted to a forward portion of said lower member;

a pair of a-arms, each of said pair of a-arms having an end portion pivotably connected to respective a-arm connecting structures of said plurality of a-arm connecting structures, each of said pair of a-arms extending laterally outwardly from said respective a-arm connecting structures, each of said pair of a-arms having a second end portion connected with a respective one of said wheel assemblies.

93. An ATV according to claim 71, wherein a rearward portion of said lower frame member is bent generally upwardly and abuts and connects to a rearward portion of said upper frame member, thereby forming said rearward cross member.

94. An ATV according to claim 71, wherein said suspension system includes a swing arm mounting structure rigidly mounted to said support module within said central opening adjacent said rearward cross member and said lower frame member.

95. An ATV according to claim 94, wherein said suspension system includes a rear swing arm pivotably connectable with said swing arm mounting structure.

96. An ATV according to claim 95, wherein said swing arm mounting structure provides an engine mounting portion, said engine being mountable with said engine mounting portion.

97. An ATV according to claim 71, wherein said upper frame member includes a plurality of body mounting structures connected thereto, each of said plurality of body mounting structures defining body mounting portions thereon.

98. An ATV according to claim 71, wherein said suspension system includes:

a plurality of a-arm connecting structures mounted to a forward portion of said lower member;

a pair of a-arms, each of said pair of a-arms having an end portion pivotably connected to respective a-arm connecting structures of said plurality of a-arm connecting structures, each of said pair of a-arms extending laterally outwardly from said respective a-arm connecting structures, each of said pair of a-arms having a second end portion connected with a respective one of said wheel assemblies.

99. An ATV according to claim 71, wherein said sectional profile is ellipsoidal, said first sectional dimension being a major axis thereof and said second sectional dimension being a minor axis thereof.

100. An ATV according to claim 71, wherein said suspension system includes a forward suspension subsystem and a rearward suspension subsystem.

101. An ATV according to claim 100, wherein at least one of said forward and rearward suspension subsystems is a fully-independent type suspension subsystem.

102. An ATV according to claim 100, wherein at least one of said forward and rearward suspension subsystems is a semi-independent type suspension subsystem.

103. An ATV according to claim 100, wherein at least one of said forward and rearward suspension subsystems is a non-independent type suspension subsystem.

104. An ATV according to claim 100, wherein at least one of said forward and rearward suspension subsystems is connectable with said lower frame member.

105. An ATV according to claim 100, wherein said at least one of said forward and rearward suspension subsystems is connected to an exterior surface of said lower frame member.

106. An ATV according to claim 71, wherein said upper frame member defines a generally vertically extending steering column-receiving opening therethrough, said steering system including a steering structure disposed above said upper frame member and connected to a steering column, said steering column extending from said steering structure through said steering column-receiving opening to be connectable with said pair of forward wheel assemblies.

107. An ATV comprising:

a frame including at least an upper member and a lower member interconnected with the upper member to define an engine receiving space therebetween, at least one of the upper member and the lower member consisting essentially of a single beam having a surface with a plurality of suspension mounting points;

at least a front outboard wheel assembly and a rear outboard wheel assembly being suspended from said wheel suspension mounting points provided on said surface of one of said upper member and said lower member of the frame; and

an engine provided in said engine receiving space for powering at least one of said wheel assemblies.

108. An ATV according to claim 107, wherein each of the upper and lower members consists essentially of a single beam.

109. An ATV according to claim 108, further comprising at least one cross member connecting the upper and lower members, that at least one cross member consisting essentially of a single beam.

110. A frame for an ATV comprising:

at least an upper member and a lower member interconnected to the upper member to define an engine receiving space therebetween, at least one of the upper member and the lower member consisting essentially of a single beam having a surface; and

at least one suspension mounting point for a corresponding one of an outboard front and rear wheel assembly, the at least one suspension mounting point being provided on the surface of one of the upper member and the lower member.

111. An ATV comprising:

an engine;

a plurality of wheel assemblies, at least one of the wheel assemblies being powered by the engine;

a suspension system operatively coupled to each of said wheel assemblies; and

a frame, said frame including:

a support module with a central opening for receiving the engine, said support module including an upper frame member and a lower frame member connected to the upper frame member,

at least a portion of the support module comprising one of the upper and lower frame members that includes only a single closed tubular frame member in lieu of a pair of frame members that would normally be provided for said portion of the supporting module.

112. An ATV according to claim 111, wherein each of the upper and lower members consists essentially of a single beam.

113. An ATV according to claim 112, further comprising at least one cross member connecting the upper and lower members, the at least one cross member consisting essentially of a single beam.

114. An ATV according to claim 111, wherein at least one of said upper and lower frame members has a sectional profile with a first dimension thereof greater than a second dimension thereof, said second dimension being normal to said first dimension.

115. An ATV according to claim 111, wherein each of the upper and lower frame members has a sectional profile with a first dimension thereof greater than a second dimension thereof, said second dimension being normal to said first dimension.

116. A frame for an ATV comprising:  
a support module with a central opening defining an engine receiving space, said support module including a first frame member and a second frame member connected to the first frame member,

at least a portion of the support module comprising one of the first and second frame members that includes only a single closed tubular frame member in lieu of a pair of frame members that would normally be provided for said portion of the supporting module.

117. A frame according to claim 116, wherein at least one of said first and second frame members has a sectional profile with a first dimension thereof

greater than a second dimension thereof, said second dimension being normal to said first dimension.

118. A frame according to claim 116, wherein each of the first and second frame members has a sectional profile with a first dimension thereof greater than a second dimension thereof, said second dimension being normal to said first dimension.

119. A frame for an ATV comprising:

- a first frame member;
- a second frame member; and
- at least a first cross member and a second cross member extending between said first and second members to thereby define a closed perimeter with an engine receiving space therein,

wherein a ratio of a sectional width to a sectional height of each of the first member, the second member, the first cross member, and the second cross member is greater than one.

120. A frame for an ATV comprising:

- a first frame member;
- a second frame member; and
- at least one cross member extending between said first and second frame members to thereby define an engine receiving space therein,



wherein at least one of the first frame member, the second frame member, and the at least one cross member comprises only a single closed tubular structure in lieu of a pair of frame members that would normally be provided.

121. A frame for an ATV comprising:

a first frame member;

a second frame member; and

at least one cross member extending between said first and second frame members to thereby define an engine receiving space therein,

wherein the first frame member, the second frame member, and the at least one cross member are disposed substantially within a common plane.

122. A frame according to claim 121, wherein one of the first and second frame members is positioned substantially along a longitudinal centerline of the frame.

123. A frame according to claim 121, wherein the first member is an upper member and the second member is a lower member, and the common plane is a vertical plane.

124. The frame according to claim 121, wherein the first member is a left lateral member and the second member is a right lateral member, and the common plane is a horizontal plane.

125. An ATV comprising:

an engine;

a plurality of wheel assemblies, at least one of the wheel assemblies being powered by the engine;

a suspension system operatively coupled to each of said wheel assemblies; and

a frame comprising:

a first frame member,

a second frame member, and

at least one cross member extending between said first and second frame members to thereby define an engine receiving space therein for receiving the engine,

wherein the first frame member, the second frame member, and the forward and rearward cross members are disposed substantially within a common plane.

126. An ATV according to claim 125, wherein at least one of the first and second frame members is positioned substantially along a longitudinal centerline of the frame.

127. An ATV according to claim 125, wherein the first member is an upper member and the second member is a lower member, and the common plane is a vertical plane.

128. An ATV according to claim 125, wherein the first member is a left lateral member and the second member is a right lateral member, and the common plane is a horizontal plane.